

# Restrained Joint PVC Pipe



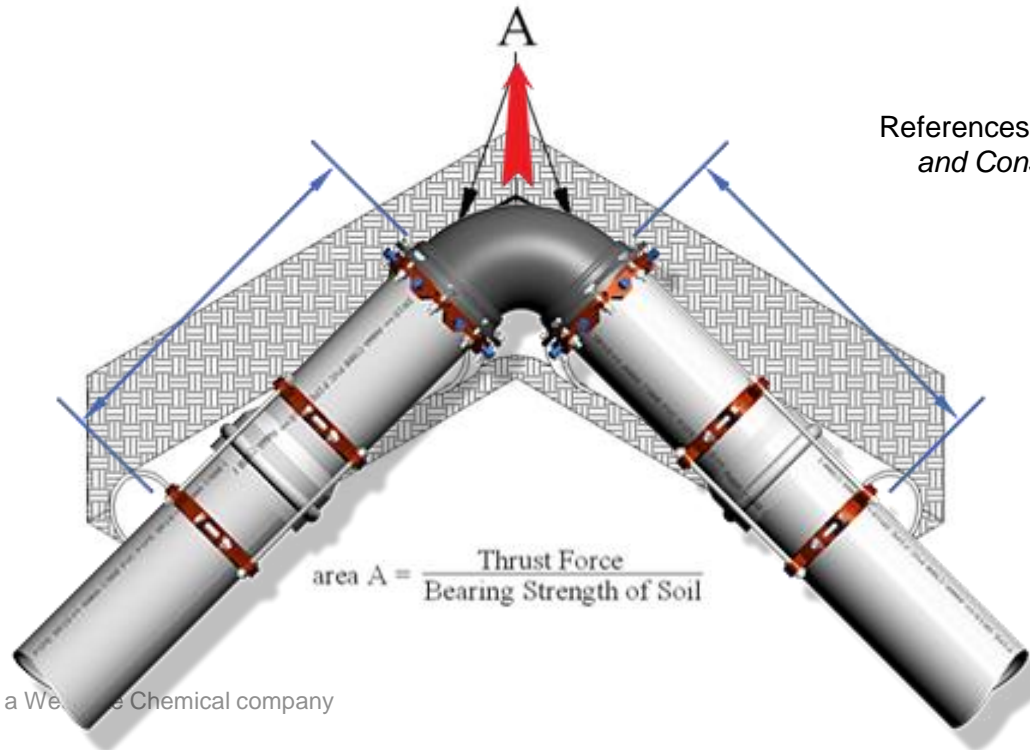
**North American  
Pipe Corporation**

North American Pipe Corporation, a Westlake Chemical company

# Open-Cut Installation

Unrestrained PVC pipe requires joint restraint at changes in direction at fittings (tees, bends, elbows, and crosses), changes in pipe size, dead ends, closed valves, and hydrants

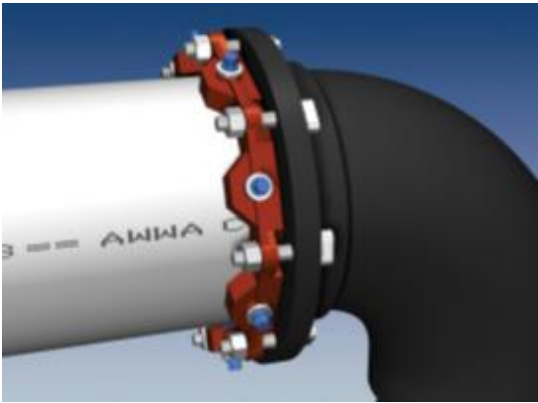
- Replacing concrete thrust blocks with MJ joint fittings and external restraints (e.g. bell harness)
- Other options available on the market



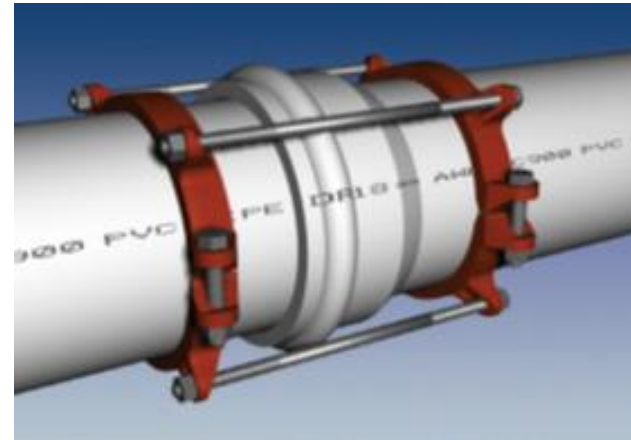
References: *PVC Handbook of Design and Construction* and EBAA Iron

# Metallic pipe restraint

Mechanical-joint (MJ) restraints



Bell-harness restraints



1. Twist-off nuts - wedge assemblies, achieve proper torque and then break off further tightening is not recommended.
2. Nuts to be tightened to a specific torque value. Use of a torque wrench is recommended.
3. Hand-tightened nuts – found on bell-harness connecting rods. Wrench-tightening can cause over-insertion of the pipe joint.

# Metallic pipe restraint considerations

- Corrosion control
- Joint assembly time
- Necessary tools and equipment
- Cost of labor must be factored in

Other options are available...



# Various types of Joint Restraint Systems



Internally restrained gasketed joint.



Pin-and-groove gasketed joint.



Spline-lock gasketed joint.

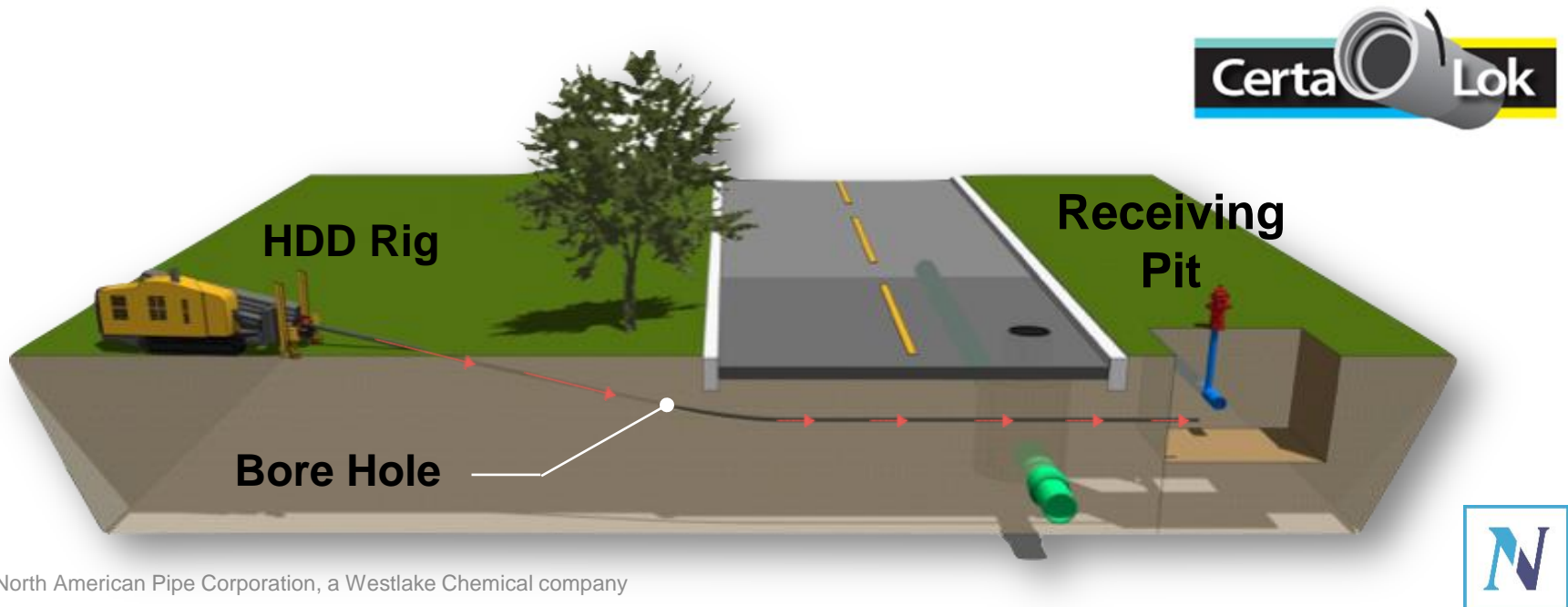
Figures from Chapter 13 found in the  
PVC Handbook of Design and Construction

# Trenchless - Horizontal Directional Drilling

Place pipeline under obstacles without disturbing surface

- Road crossing
- Bodies of water
- Sensitive areas

Bore → Ream → Pull back pipe



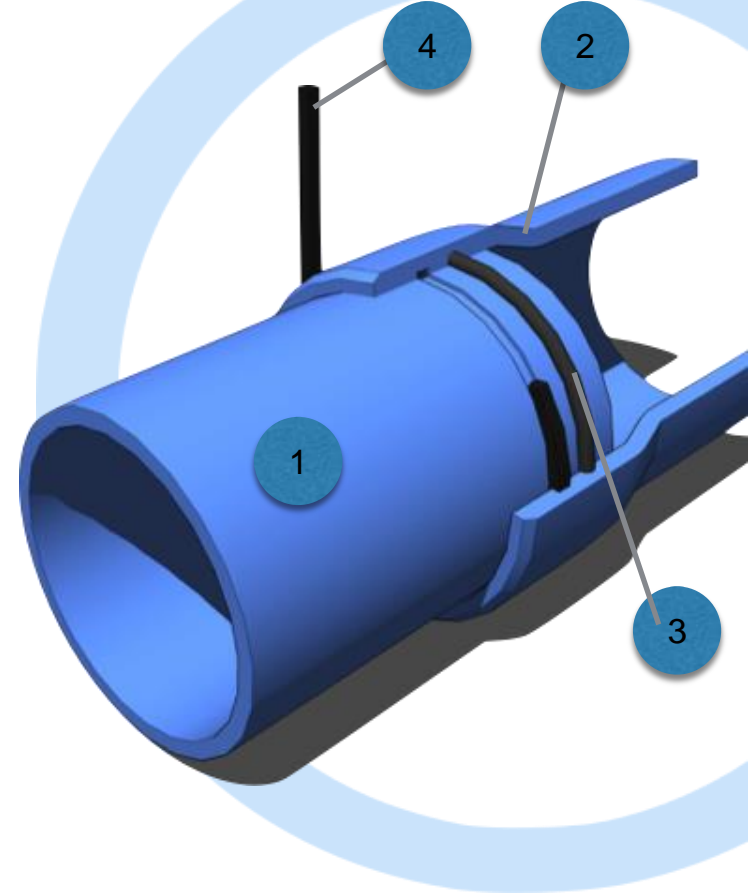
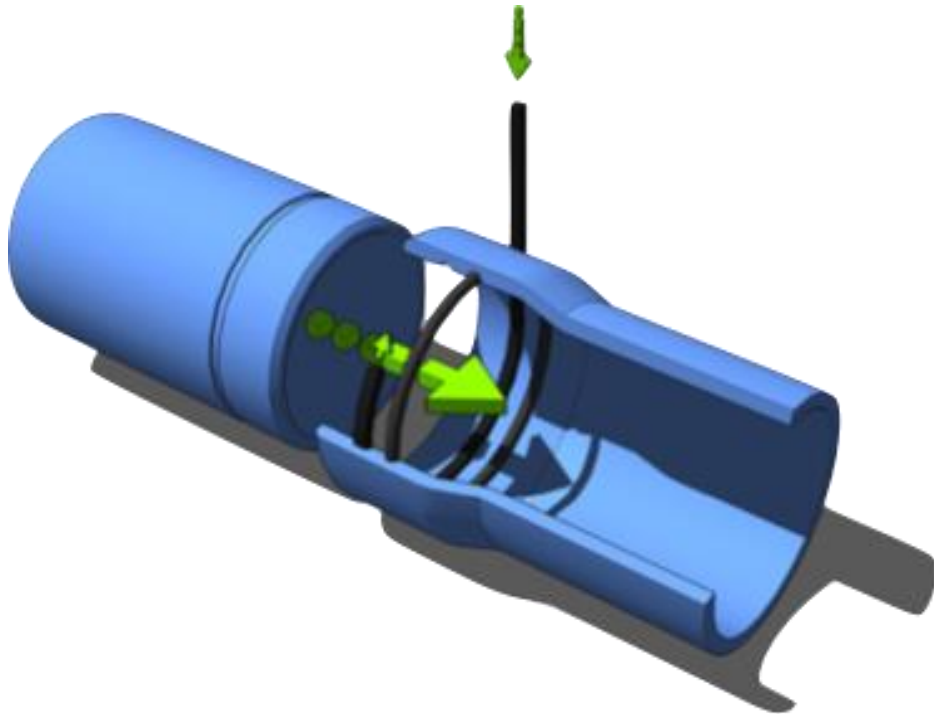
# Casing Installation

Restrained joint pipe has a smaller OD compared to conventional bell & spigot metallic pipe restrainers:

- Allows use of smaller, less expensive steel casing
- Smaller borehole is less expensive to drill



# C900 (CIOD) Certa-Lok Restrained Joint Integral Bell (RJIB)



- 1 Certa-Lok RJIB Spigot
- 2 Certa-Lok RJIB Bell
- 3 O-Ring or Fluid-Tite Profile Gasket
- 4 High Shear Strength Nylon Spline

N.B. standard lay length 10' and 20'

# Performance Data

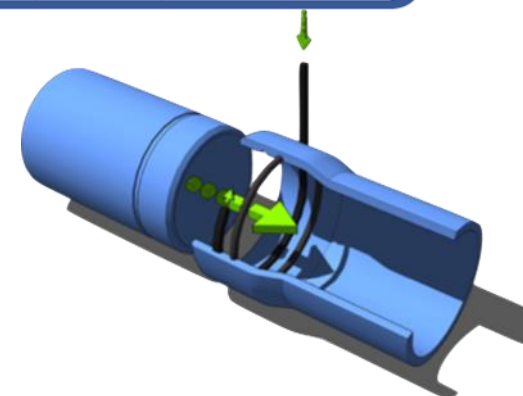


**C900/RJIB CERTA-LOK® PIPE DIMENSIONS**

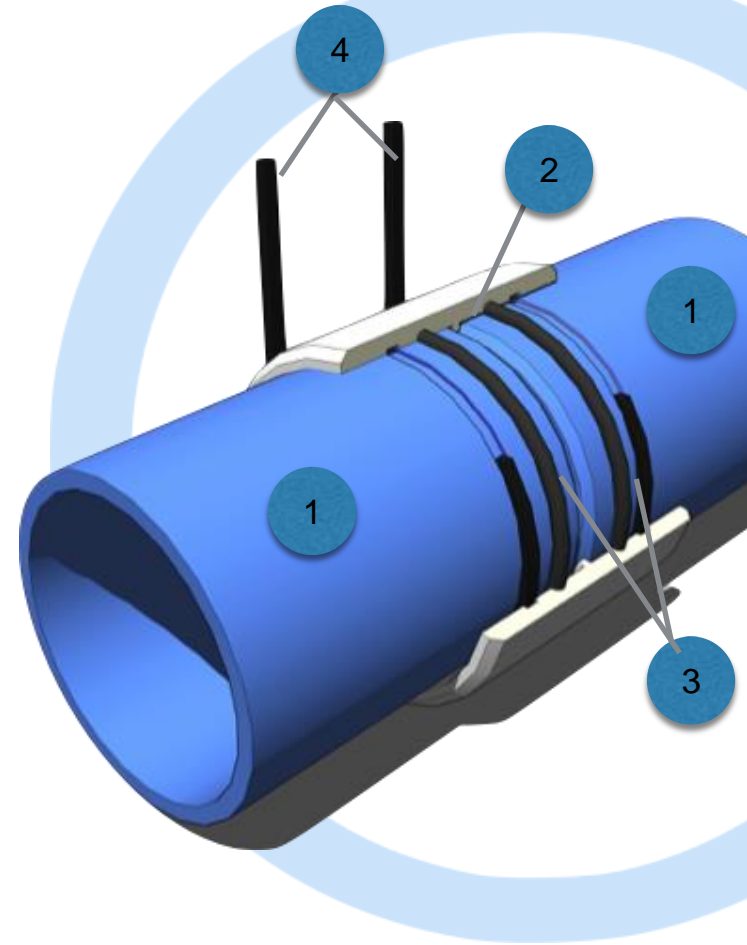
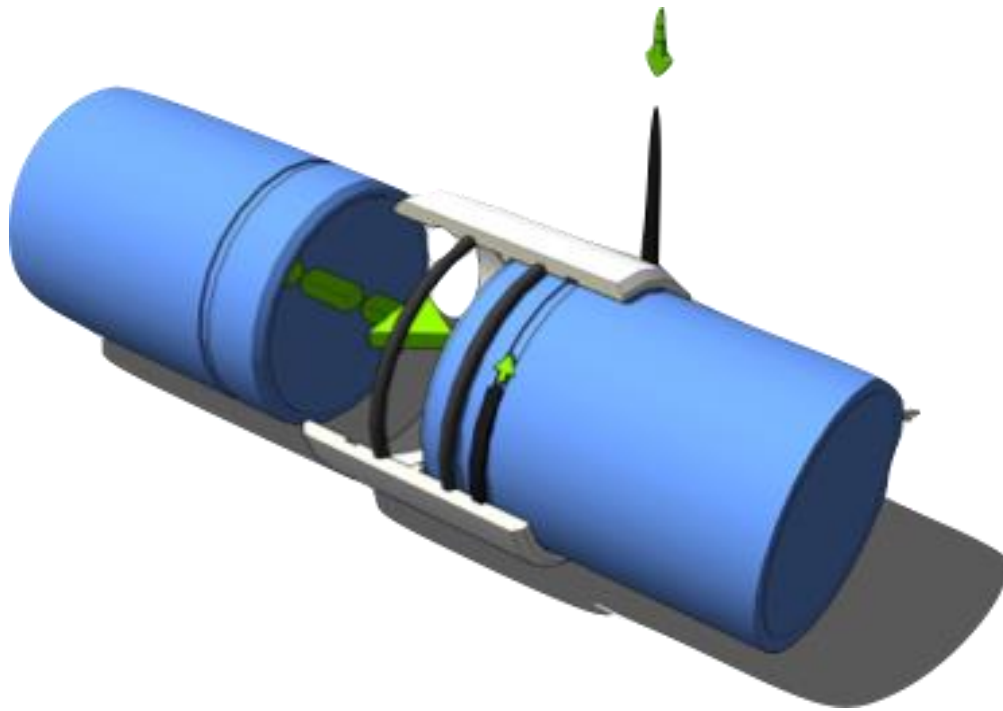
Nom. Size	Outside Diameter (OD)	DR	Pipe							
			Min. Wall Thickness (T1)	Flow Internal Diameter (ID)	X	W	D	P	BOD	Weight (lb/ft)
6"	6.900	18	0.383	6.134	3.000	0.500	0.145	0.271	7.816	5.3
		14	0.493	5.914					8.030	6.6
8"	9.050	18	0.503	8.044	3.163	0.500	0.145	0.634	10.262	9.1
		14	0.646	7.758					10.542	11.5
10"	11.100	18	0.617	9.866	3.625	0.750	0.215	0.634	12.781	13.7
		14	0.793	9.514					13.177	17.3
12"	13.200	18	0.733	11.734	3.625	0.750	0.215	0.634	15.247	19.4
		14	0.943	11.314					15.681	24.5

**JOINT PERFORMANCE DATA**

Nom. Size	DR	Pressure Class (psi)	Min. Bend Radius (ft)	Max. Pull Force (lbf)
6"	18	235	144	20,100
	14	305		22,300
8"	18	235	188	27,500
	14	305		31,000
10"	18	235	232	49,500
	14	305		52,600
12"	18	235	275	60,000
	14	305		60,000



# C900 (CIOD) Certa-Lok Restrained Joint (RJ)



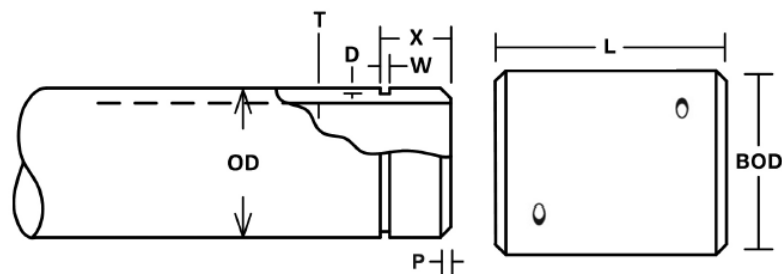
- 1 Certa-Lok RJ Pipe
- 2 Certa-Lok RJ Coupling
- 3 O-Ring or Profile Gaskets
- 4 High Shear Strength Nylon Splines

N.B. standard lay length 20' and 40'

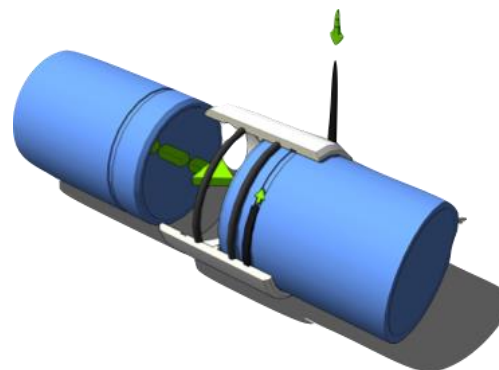
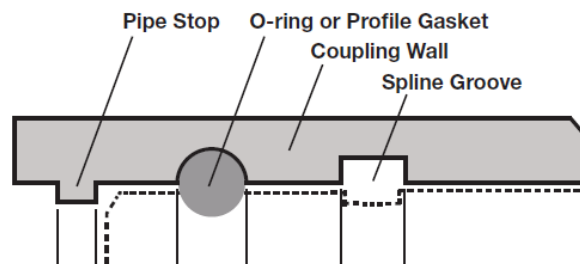
# Performance Data



JOINT PERFORMANCE DATA				
Nom. Size	DR	Pressure Class (psi)	Min. Bend Radius (ft)	Max. Pull Force (lbf)
4"	18	235	100	7,800
	14	305		9,800
6"	18	235	144	16,000
	14	305		18,900
8"	18	235	188	23,100
	14	305		24,300
10"	18	235	232	40,500
	14	305		48,700
12"	18	235	275	50,500
	14	305		53,800
14"	25	165	319	52,500
	18	235		61,500
16"	25	165	363	68,500
	21	200		68,500
	18	235		68,500
18"	25	165	406	97,000
	18	235		113,000
20"	25	165	450	107,500
	18	235		117,500
24"	25	165	538	120,000
	18	235		145,000



C900/RJ COUPLING DETAIL:



# RJIB and RJ

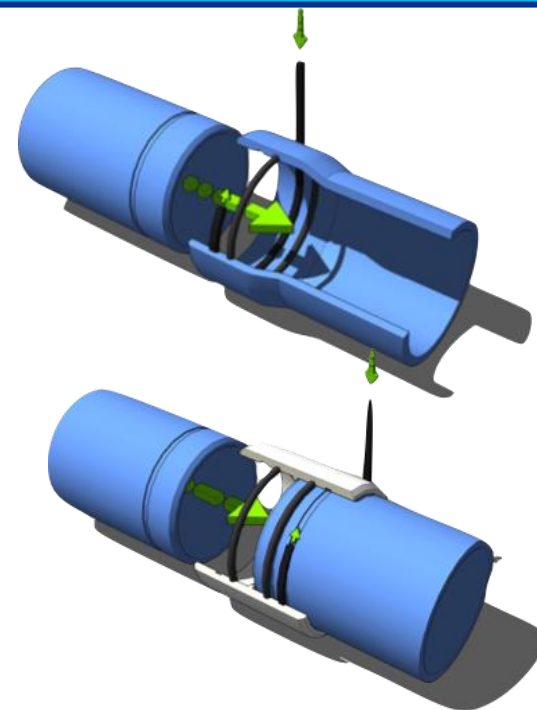


## RJIB

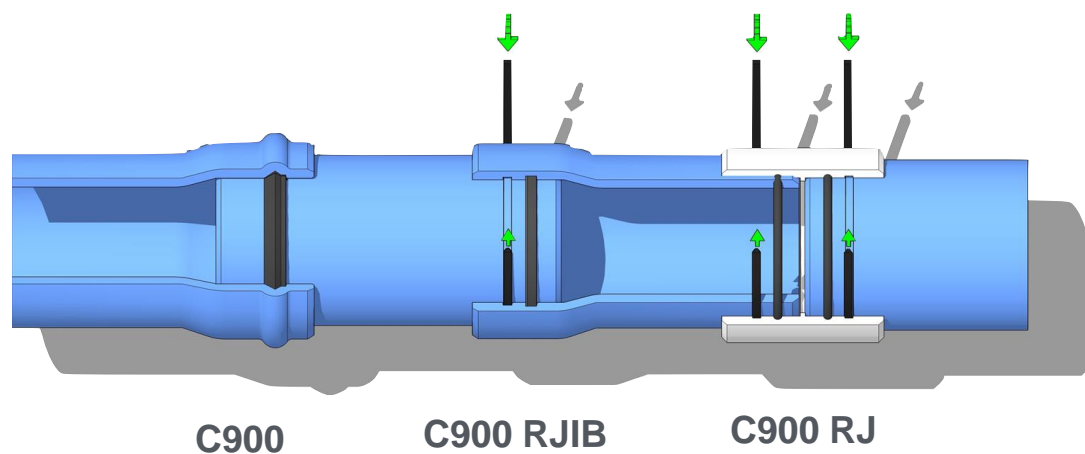
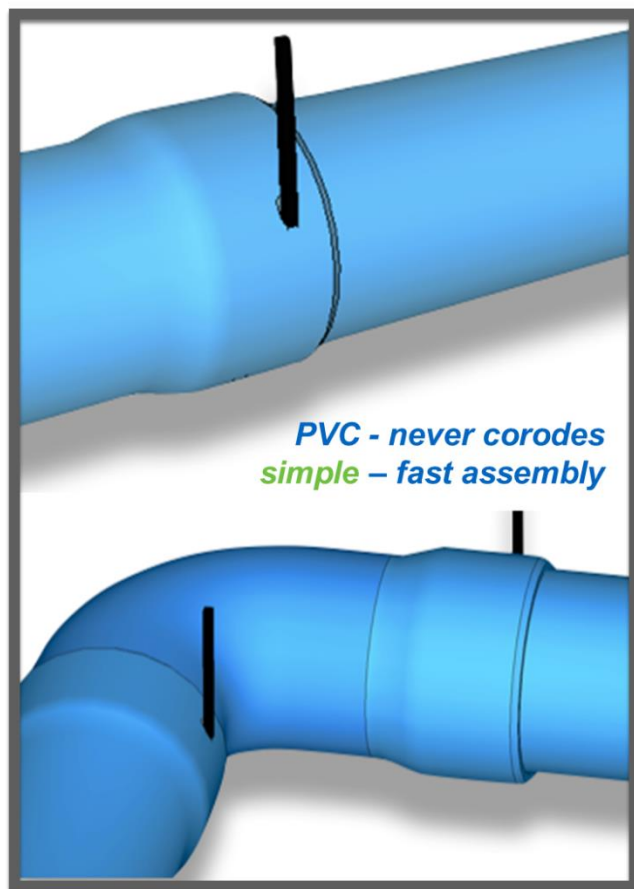
- 2<sup>nd</sup> Generation Product
- Our standard → better availability
- Half as many splines and gaskets → faster installation
- Smoothed bell creates less resistance

## RJ

- Optional NBR (nitrile) gaskets available
- Twice as much open-cut angular joint deflection  
1 degree total (1/2 degree per side of coupling) versus RJIB's 1/2 degree total
- Larger sizes – 14" through 24"



# For both open cut and trenchless



C900 Joints Work Together

# Fast Assembly



**1. Clean,  
Lubricate &  
Assemble Joint**



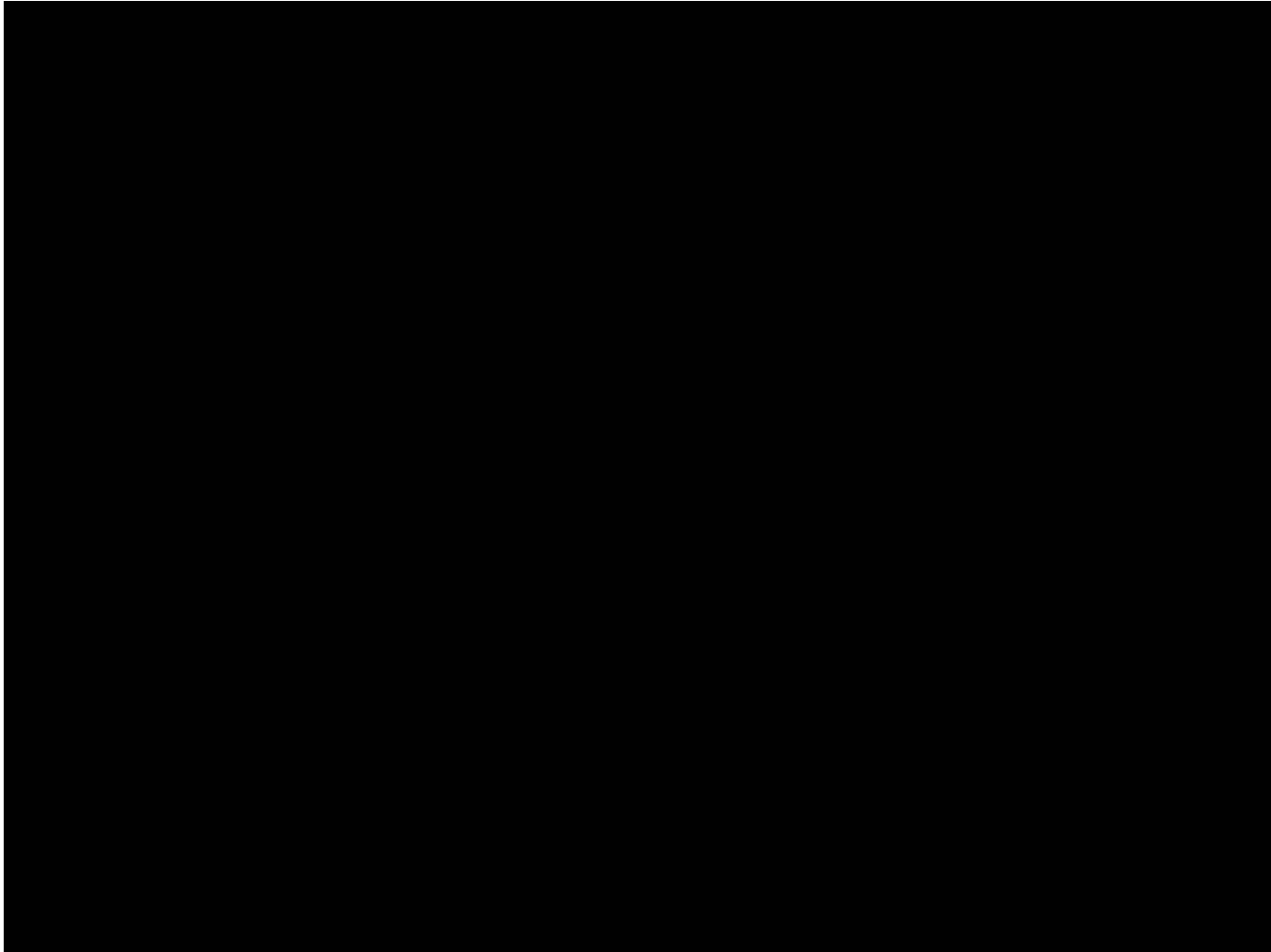
**2. Insert Spline**



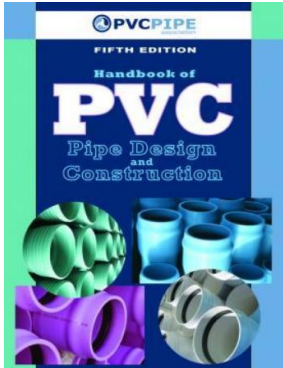
**3. Pullback  
Continues**

# Joint Assembly

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# References



Handbook of PVC Pipe Fifth Edition, Uni-Bell (2012)



PVC Pipe Design and Installation AWWA M23 (2002)

## References:

North American Pipe website, [www.northamericanpipe.com](http://www.northamericanpipe.com)

EBAA Iron website: [www.ebaa.com](http://www.ebaa.com);

Technical Briefs: “Installation of PVC Pipe into a Mechanical Joint (MJ),” Uni-Bell (2016); “Thrust Forces – Restraint-Length Calculator,” Uni-Bell (2016);

[www.uni-bell.org](http://www.uni-bell.org)

